

SECRET

25X1



CIA/RR EM SC 66-13

SC No. 09644/66

20 September 1966

Copy No. 225

INTELLIGENCE MEMORANDUM

CABLE BRIDGES IN NORTH VIETNAM

DIRECTORATE OF INTELLIGENCE

NGA Review Completed.

MORI

25X1

SECRET

GROUP 1
Excluded from automatic
downgrading and
declassification

Page Denied

C O N T E N T S

	<u>Page</u>
Summary	1
1. Discovery of Cable Bridges	3
2. Location of Bridges	3
3. Characteristics of Cable Bridges	4
4. Advantages of the Cable Bridge	5
5. Sources of Cable	6

Table

Cable Bridges in North Vietnam and Laos	7
---	---

Illustrations

Figure 1. North Vietnam: Cable Bridges (map) <u>following page</u>	4
---	---

Figure 2. 	4
--	---

Figure 3. 	4
--	---

Figure 4. 	4
--	---

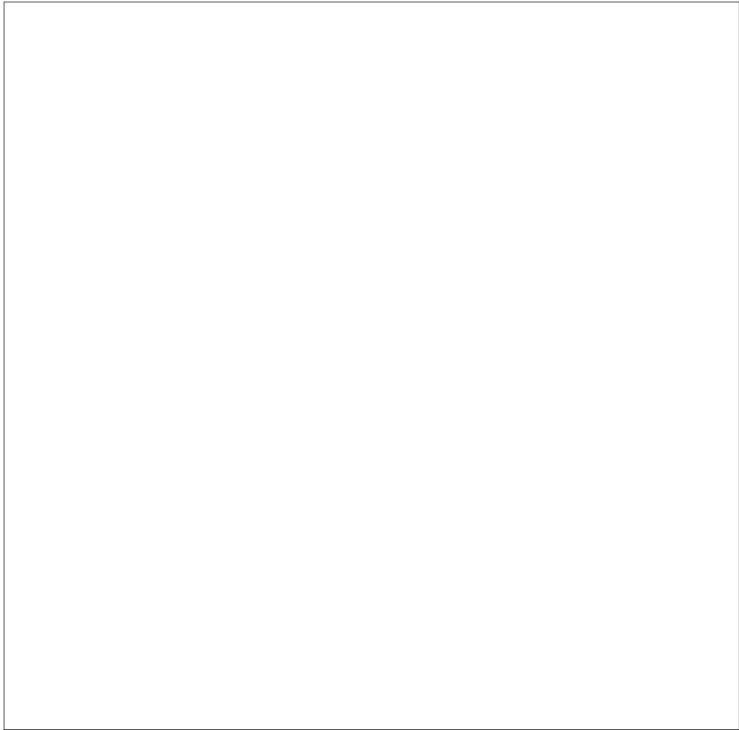
Figure 5. 	6
--	---

Figure 6. 	6
--	---

CABLE BRIDGES IN NORTH VIETNAM*

Summary

In their determination to keep important transportation routes open despite US and South Vietnamese bombings, the North Vietnamese have developed a unique bridging technique that greatly reduces the vulnerability of bridges to aerial interdiction. The technique is based on the use of parallel steel cables drawn taut and secured to anchorages at each end. Prefabricated wood sections are secured to the cables to provide the bridge deck. Except on cable bridges constructed for rail lines, the decking is removed during daylight hours. With the deck removed the bridge is far less vulnerable to bomb damage than conventional bridges.

Twenty-four cable bridges, in various stages of construction -- including one in Laos -- have been detected in aerial photography since the beginning of June. These bridges are located, for the most part, along the highways comprising the major logistic network for the resupply of Communist forces in Laos and South Vietnam. Ten of the bridges, including four rail bridges, are located in Military Region IV, the principal staging area for the infiltration of men and supplies into South Vietnam. With one exception the gross load capacity of these bridges ranges between 10 and 20 short tons. This capacity is adequate to accommodate all but the very largest trucks in the North Vietnamese inventory.

The rapid increase in sightings of cable bridges and the sharp increases in imports of large-diameter steel wire rope -- principally from Japan -- indicate that the North Vietnamese will make even more use of this innovation. The cable bridges permit more continuous use of railroads and highways and will reduce substantially the effort required to repair bomb damage.

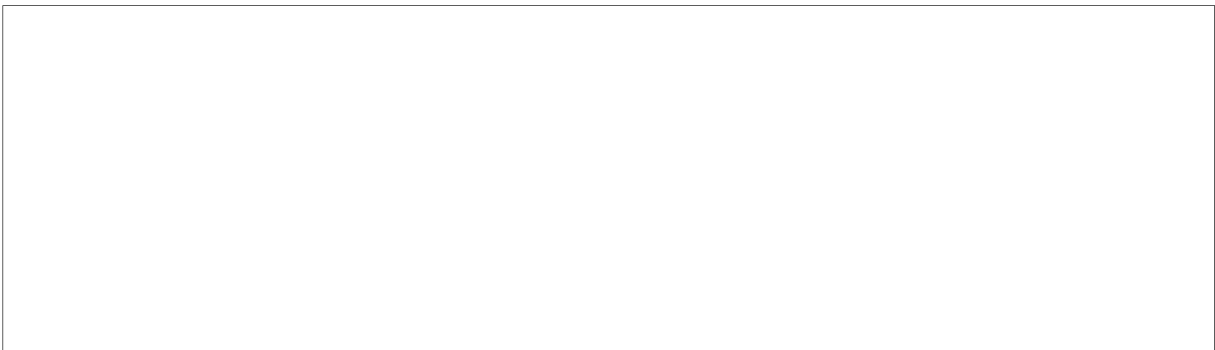
* This memorandum was produced solely by CIA. It was prepared by the Office of Research and Reports on the basis of photography available as of 14 September 1966 and was coordinated with the Office of Current Intelligence; the estimates and conclusions represent the best judgment of the Directorate of Intelligence as of 19 September 1966.

1. Discovery of Cable Bridges

Continuous bombing of lines of communications in North Vietnam by US and South Vietnamese air forces has posed a formidable problem for the Communists in keeping major routes open to traffic. With the use of large amounts of labor and local building materials, they have been quite successful in building temporary crossings at destroyed bridge sites. Restrikes by Allied bombers, however, have made repair work a treadmill process for the North Vietnamese. The Communists have developed a technique of bridge construction based on the use of parallel steel cables drawn taut and secured to anchorages on each river bank. Prefabricated wooden sections are attached to the cables to provide the bridge deck. Except on cable bridges constructed for rail lines, the bridge decking is removed during daylight hours, thus rendering the bridge less vulnerable to bomb damage.

2. Location of Bridges

The locations of the 24 cable bridges discovered by aerial photography indicate that their primary purpose is to help keep open supply lines used to support Communist military forces in Laos and South Vietnam (see the map, Figure 1, and the table). Seven cable bridges are located on highways 1A and 15 south of Hanoi and one on route 912 in Laos, the main land routes for the movement of supplies to South Vietnam. Eight more are on roads used to supply Communist forces in North and Central Laos. Four bridges are on the rail line segment south of Vinh which uses only lightweight, makeshift rolling stock and carries supplies moving south to the Ho Chi Minh Trail in Laos. The rails and ties used on these bridges are not removed during the day. Two other cable bridges for vehicles span canals near Hanoi and lead to buried petroleum storage sites and one is on route 1A northeast of Hanoi, halfway to the border of Communist China. The remaining cable bridge, on route 2 northwest of Hanoi, can probably support only cart traffic because of its narrow width and great length.



The North Vietnamese in the past have used bridge sections which could be moved during the day to make it appear that a bridge was destroyed. This type of deception was also practiced in North Korea during the Korean War and by the Japanese during World War II. The use of cable spans, however, is an innovation.

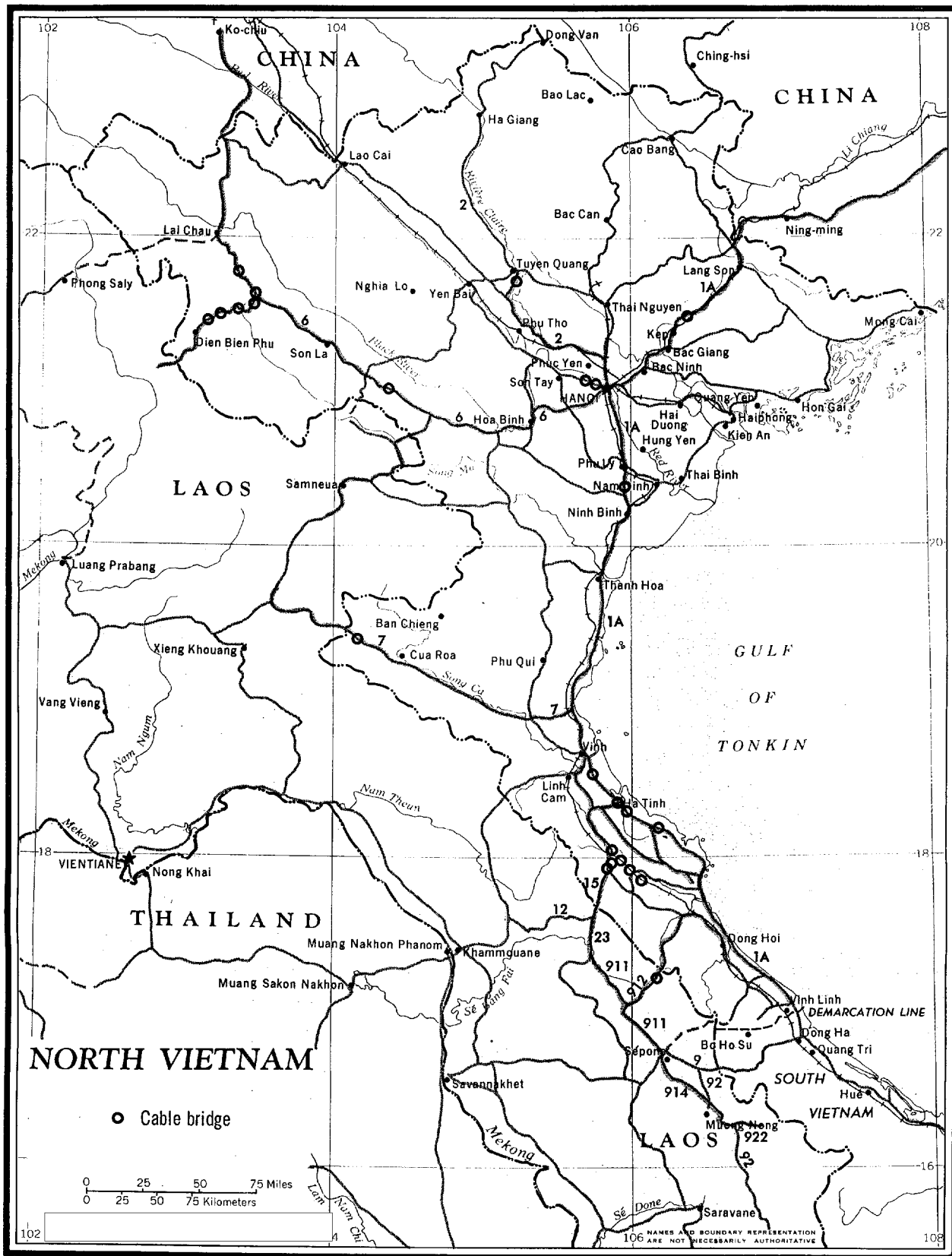
3. Characteristics of Cable Bridges

The similarities among the cable bridges seen in photography indicate that a standard design has been developed which is modified on site to fit conditions of span length and geology (see Figure 4). All but two of the cable bridges are located at the site of destroyed bridges or at abandoned bridge construction where the abutments already in place can provide additional support to keep the anchorages stationary. The anchors are "TT" shaped with the ends of the legs facing the bridge and act as stabilizing troughs for the steel cables. The anchors are set back from the abutments about 50 to 100 feet and are probably made of reinforced concrete. There are usually four to six cables in place, estimated to be one to three inches in diameter, but a recently observed cable bridge is being built with 12 to 14 cables. The cables are parallel and paired in alignment with the wheel gauge of a truck. When cables of different diameters are used, the larger cables have been placed in the outside position for greater strength. The bridges do not appear to be braced against side sway; thus speed of crossing must be severely limited and movement restricted to one vehicle at a time. In most cases the removable decking covers all the cables. The decking is in 5- to 10-foot sections that are probably made from light timber or bamboo. A work crew permanently stationed near the bridge site places the deck sections on the cables at night, either manually or with a portable winch.

The load-bearing capacity of a cable bridge is, among other things, a function of the number of cables in place and the length of the span. Most of the highway bridges are 50 to 100 feet in length and should be able to support about 15 tons. Five highway bridges have spans from 150 to 190 feet and probably can carry a gross load of 10 tons. The cable bridge under construction north of Tu Dung on route 1A has 12 to 14 cables and a 75-foot span. The capacity of this particular bridge could exceed 20 tons. The bridges most recently discovered have incorporated design improvements such as three anchors on each side and six or more cables. Because load limitations are set by the capacity of the weakest bridge, routes 7, 15, and 19 can accommodate vehicles of about 15 tons gross weight, whereas routes 1A and 6 and the canal crossings near Hanoi can carry 10 tons.

Figure 1

Location of Cable Bridges in North Vietnam



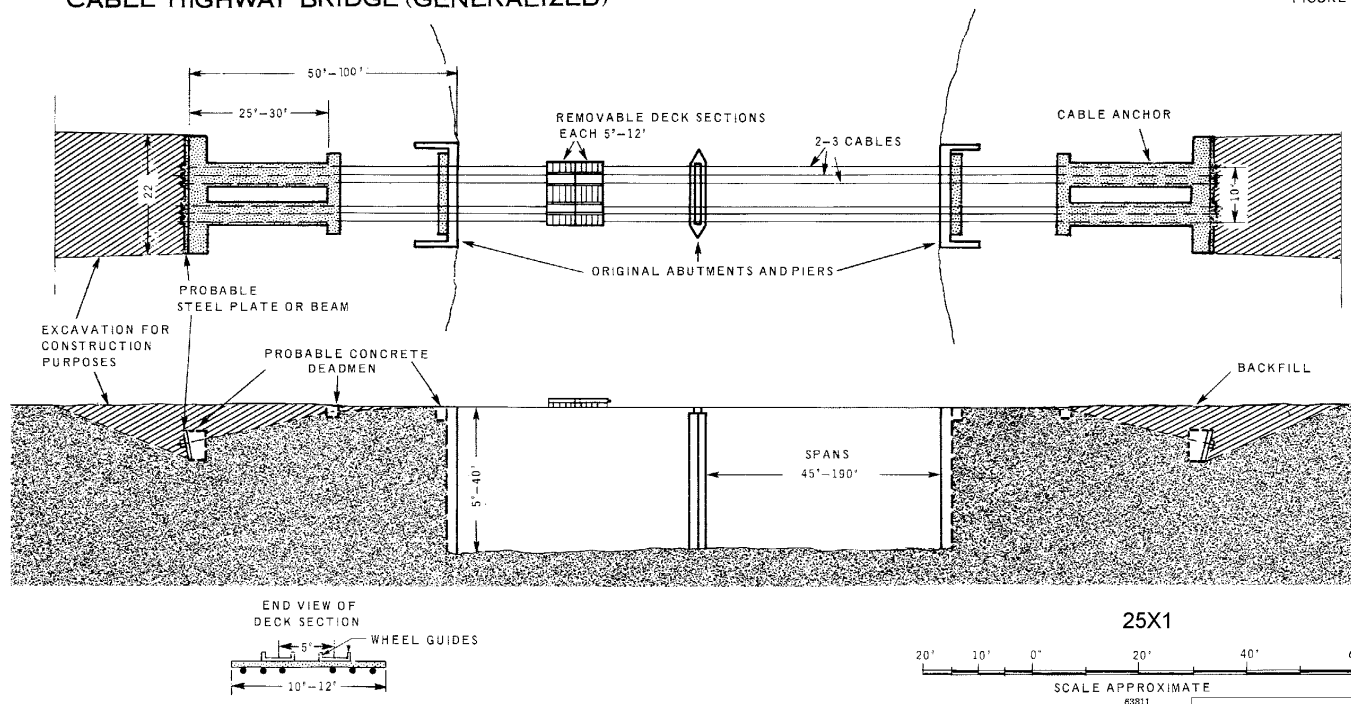
63816

Page Denied

Next 1 Page(s) In Document Denied

CABLE HIGHWAY BRIDGE (GENERALIZED)

FIGURE 4



The four railroad cable bridges are located on an isolated section of the uncompleted Vinh - Dong Hoi rail line. Recent photography reveals that this rail segment is operational for only 45 miles, starting from a point 24 miles south of Vinh. The line is using makeshift, lightweight rolling stock, and the prime mover is believed to be a camouflaged truck using flanged wheels. The cars are about 17 feet long by 8 feet wide, and the center-to-center axle span is about 10 feet. The bridges each have two cables per bridge, ties resting directly on the cables, and have anchors that are much less massive than on the highway bridges [redacted]. The distance between spans on supporting A-frames is 18 to 25 feet. The gross weight limits are estimated at 5 to 7 tons, with each car crossing singly at low speed, probably pulled by cable or rope. These bridges cannot support a train of cars.

4. Advantages of the Cable Bridge

The main advantage of the cable bridge is that with the decking removed it is difficult to detect and less vulnerable to aerial interdiction than a temporary timber bridge or an improved ford. The cables are extremely difficult to destroy. The only apparent method of interdiction would be to bomb the cable anchorages buried on the river banks in an attempt to loosen enough dirt to make the anchorages incapable of keeping the cables taut enough for the crossing of trucks.

When a cable bridge is interdicted, it is probably easier to repair than other types of temporary bridging and less costly in terms of time and labor. Moreover, more repair work can probably be done during daylight hours at a smaller risk of casualties to the repair crews from air attack because all the work is done on the stream banks. No work would need to be done in midstream where the rapid dispersal of workers is more difficult. A broken cable can be replaced with relative ease, and prefabricated deck sections can be made quickly and inexpensively from local materials. Not only are the buried anchors extremely difficult to destroy but they also can be replaced in a relatively short time. Heavy cratering on the approaches would require backfilling and considerable tamping to restore resistance within the earth mass that exerts the reinforcement needed in front of the anchors.

The use of cable bridges, however, will require the North Vietnamese to station permanent work crews at each bridge to move the deck sections on to the cables at dusk and remove them before dawn. The installation and removal of bridge decking will require speed and

coordination among work crews to allow continued movement of truck traffic at rates greater than was achieved using other crossing methods. On 9 May 1966 the Ministry of Communications and Transportation in Military Region 4 ordered one of its workcamps to set up the Muong Sen bridge on route 7 each day at 1700 hours and dismantle it at 0500. The ministry claimed that the crew at the bridge had been setting it up too late and dismantling it too early for several days. In addition to the problem of speed and coordination, the use of steel cables will increase the cost of bridge repair work to the North Vietnamese because other types of temporary bridging were built using entirely local building materials.

5. Sources of Cable

There are no plants producing wire rope in North Vietnam, and all of it must be imported. Negotiations for the purchase of steel wire rope have been underway between North Vietnam and other Communist countries in 1966. The purchase from Poland of an undisclosed amount of steel wire rope for a "transportation project" was being completed in July. Other queries for similar purchases from the USSR were made as early as April. It is not known whether any technical aid for the construction of cable bridges is being given by these or other Communist countries.

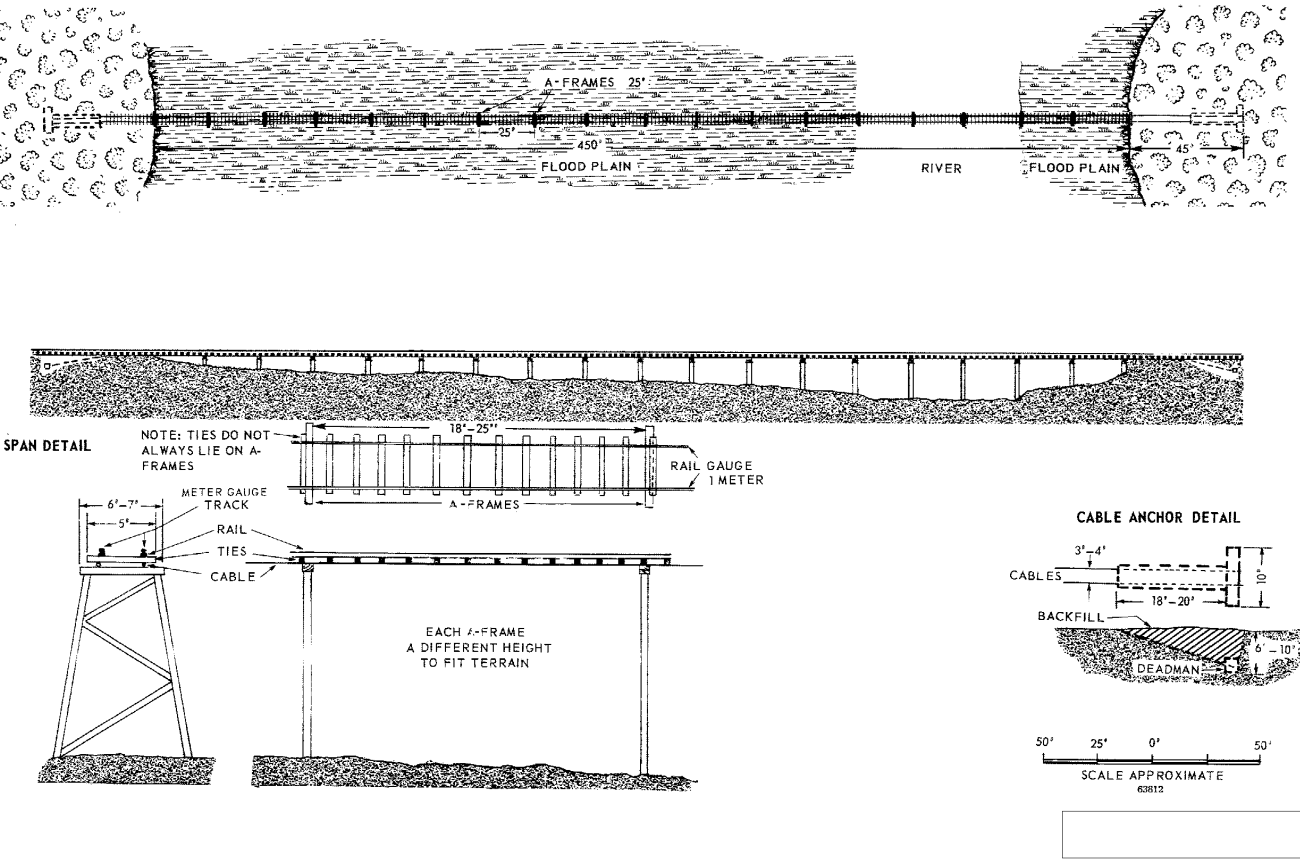
The North Vietnamese have ordered large quantities of wire rope from Japan in sizes 1-1/4 inches to 2-1/4 inches in diameter. This wire rope consists of 6 strands, 37 wires to a strand, containing a fiber core and is considered to be suitable for general engineering purposes. The sizes and breaking strengths of the wire rope shipped from Japan coincide with the type of wire rope needed for the cable bridges in North Vietnam. Three shipments from Japan to North Vietnam since May have totaled more than 550 tons, or the equivalent of about 270,000 feet of cable. The Japanese have exported wire rope to North Vietnam in the past, but not in such large quantities as the shipments thus far in 1966.

The cable bridges observed on photography have been on spans of less than 200 feet long, with 4 to 6 cables per crossing. The bridges seen to date would require no more than 20,000 to 30,000 feet of wire rope, or about 10 percent of the amount imported from Japan thus far in 1966. The North Vietnamese may have constructed a considerably greater number of cable bridges than have been seen to date on photography, and they are undoubtedly planning to expand greatly and to further refine the use of this bridging method.

Page Denied

THONG PHONG TRANG CABLE RAILROAD BRIDGE

FIGURE 6



25X1

Approved For Release 2007/10/23 : CIA-RDP78T02095R000900070006-7

25X1

25X1

25X1

25X1

25X1

25X1

25X1

25X1

25X1

Next 2 Page(s) In Document Denied

25X1

25X1

25X1

Page Denied

SECRET

SECRET